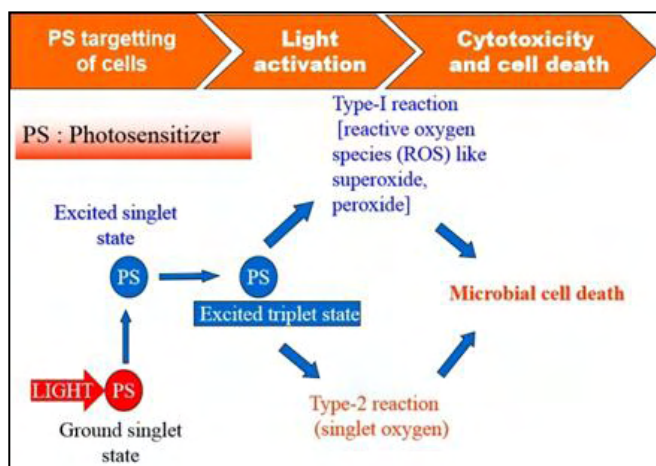


## **N.2: Incubation for development of antimicrobial photodynamic therapy device with organ-specific applications**

At RRCAT, studies on antimicrobial photodynamic therapy (APDT) are being carried out. These studies are an offshoot of photodynamic therapy (PDT) meant for treatment of tumors. APDT involves incubation of light activable drugs called photosensitizers (PS) with microorganisms for a suitable duration followed by exposure to visible light of suitable wavelength. The ensuing photochemical reactions rapidly generate reactive oxygen species, which cause damage to multiple biomolecular targets within microbial pathogens. The distinct advantage of APDT is that there is least chance of development of resistance.



*A flow chart depicting antimicrobial photodynamic therapy (APDT).*

In the last half decade, our investigations have been focused on APDT mediated inactivation of antibiotic sensitive and resistant bacteria using either cationic PS or cationic peptide conjugated anionic PS (chlorophyll derivative). These investigations have suggested that a suitable APDT window can be optimized that result in ~99% bacteria load reduction, with concomitant increase in healing response of wounds. In addition to antibacterial applications, we have recently forayed into APDT mediated inactivation of fungi and viruses, notably SARS CoV-2. Propelled by these interesting and encouraging results, we have come up with the idea of developing first-of-its-kind in India “APDT device with organ specific attachments”. These hand-held point of care devices are meant for treatment of infections of external nares (nasal cavity), oral cavity, acne and wound infections in diabetic individuals, subjects undergoing chemo/ radiotherapy, immunocompromised human subjects etc., to name a few. RRCAT and Dr. Cure and Care, New Delhi signed a collaborative incubation agreement to develop these technologies.



*Representative of M/s Dr. Cure and Care, New Delhi collecting document of incubation agreement from Dr. S. V. Nakhe, Director, RRCAT.*

Efficacies of these devices plus our customized PS formulations have been tested against various antibiotic resistant microbes under laboratory settings. Further studies in clinical settings are being carried out.

*Reported by:  
C. P. Paul (incubation@rrcat.gov.in)*

## **N.3: Incubation Centre-RRCAT offers services of electron beam radiation processing facility to Indian industries**

Electron beam radiation processing facility (EBPF) set up near Choithram Mandi, Indore is based on two indigenously developed 10 MeV, 6 kW electron linear accelerators (Linacs).



*Electron beam radiation processing facility (EBPF) set up near Choithram Mandi, Indore.*

The capacity of the system is as mentioned in table below:

Parameter Description	Value
Processing throughput	5 kGy.ton/hour
Dosage delivery capability (minimum)	100 Gy
Dosage delivery capability (maximum)	50 Gy
Typical box/bag size that can be processed*. ( length x width x height )	60 cm x 45 cm x 35 cm
*The box dimensions can be adjusted according to product density. User's box size and internal device packing arrangement need to be discussed with process experts at EBPF.	

The facility has the following licences and certifications:

1. AERB licence for facility operations.
2. FDA licence for providing electron beam processing services for sterilization of class A medical devices.
3. FDA licence for providing electron beam processing services for sterilization of class B medical devices.
4. ISO 9001:2015 and ISO 13485: 2016 certifications for providing electron beam processing services for sterilization of medical devices as per the requirements of ISO 11137-1:2006/(R) 2010.

The facility is open for irradiation of medical devices such as Surgical Dressing Material, Catheter, Specimen Receptacles, Disposable Perfusion Sets, Umbilical Occlusion Device, Bolster Suture, Alcohol Swabs, and other non-notified medical products for which the FDA loan license is not required.

The above facility is now available for sterilization of medical devices to industries on chargeable basis at 50% concessional charges for a limited period up to September 30, 2023 under "Azadi Ka Amrit Mahotsav". Sterilization by electron beam is equivalent to sterilization carried out by gamma radiation. The sterilization dose required for electron beam and gamma radiation is identical (typically 25 kGy) as both have identical effect on microbial deactivation. Moreover, electron beam technology is eco-friendly, safe and is rising fast as it does not involve use of radioisotope (Cobalt-60) and radiation can be switched ON/OFF as per requirements. The dose rate in electron beam facility is very high due to which product hold time in irradiation zone (i.e., exposure time) is very less as compared to isotope-based facility. The product batch size can be customized to meet user requirements.

The services are being offered to various sectors as per the rates mentioned in table below:

Sr. No.	Service	*Dose (kGy)	Proposed charges at ARPF
1.	Irradiation service for medical devices non-notified and risk Class- A/B/C	25	₹ 12.520 / kg
		15	₹ 7.50 / kg
2.	E-beam irradiation service for gem stones and other industrial products	Case-to-case basis	₹ 800/kW/hr.
GST and other taxes will be charged extra as per the prevailing rates and norms.			
*25 kGy 15 kGy dose are to be provided depending on the initial bio burden in accordance with Standard ISO - 11137.			

*Reported by:  
C. P. Paul (incubation@rrcat.gov.in)*

#### N.4: RRCAT celebrated its 39<sup>th</sup> Foundation Day

Raja Ramanna Centre for Advanced Technology, Indore, a unit of the Department of Atomic Energy, Government of India celebrated its 39<sup>th</sup> Foundation Day on February 21, 2022. The Chief Guest on the occasion was Dr. B. Venkatraman, Distinguished Scientist and Director, Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam. He is an internationally acclaimed scientist in the field of non-destructive evaluation and its applications in the area of nuclear engineering and technology. Dr. Shovan K. Majumder, Chairman, Seminar Committee, introduced the Chief Guest.



*Dr. S. V. Nakhe, Director, RRCAT, welcoming the Chief Guest, Dr. B. Venkatraman, Director, IGCAR.*